

## SECTION 02530

### EXTERIOR SEWAGE LIFT STATION

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#### **LANL MASTER CONSTRUCTION SPECIFICATION**

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the Engineering Standards Manual (ESM) Civil POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within "stars " during editing.

Coordinate this Specification with Civil Standard Drawings ST-G3020-2, Duplex Sanitary Sewage Lift Station.

Specification developed for ML-3 / ML-4 projects. For ML-1/ML-2, additional requirements and QA reviews are required.

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#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Submersible pumps and equipment for sanitary sewer lift station.

##### 1.2 LANL PERFORMED WORK

- A. LANL's Support Services Subcontractor will perform acceptance inspection, testing, adjusting and tie-in of lift station. See PART 3.

##### 1.3 SUBMITTALS

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The LANL Utilities Group Wastewater Representative shall approve design, location, and submittals of sewage lift station.

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- A. Submit the following in accordance with Section 01330, Submittal Procedures:
  - 1. Catalog data.
  - 2. Pump curves.

3. Operation and maintenance data.
  - a. Theory of operation.
  - b. Test procedure.
4. Warranties.

#### 1.4 WARRANTY

- A. Manufacturer's printed warranties shall apply to pumps.
- B. Provide five years or 10,000 hours warranty after installation, including parts and labor.
- C. Provide for repairs to be performed at the manufacturer's authorized warranty repair station located within a 200 mile radius of this Project.

### PART 2 PART 2 PRODUCTS

#### 2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01630, Product Options and Substitutions.

#### 2.2 ACCEPTABLE MANUFACTURE

- A. Flygt - No Substitutions.
- B. Pumps shall be readily removable and replaceable without de-watering wet well or disconnecting any piping in wet well.

#### 2.3 PERFORMANCE AND DESIGN REQUIREMENTS

- A. See Schedule in PART 3.

#### 2.4 PUMP MATERIALS

- A. Volute, impeller, motor housing, discharge elbow, and other components: Gray cast iron, ANSI Class 30.
- B. Shaft: Stainless steel or carbon steel.
- C. Motor:
  1. Rotor bars and short circuit rings: Aluminum.
  2. Windings: Copper.
  3. Stator winding and lead insulation: NEMA Class F.

- D. Mechanical Seals:
  - 1. Lower: Tungsten carbide/tungsten carbide.
  - 2. Upper: Tungsten carbide/carbon.
- E. Wear Ring:
  - 1. Case wear ring: Steel with molded nitrile rubber.
  - 2. Impeller wear ring: ANSI 304 stainless steel. Provide on pump greater than 15 HP.
- F. Exposed Nuts and Bolts: ANSI 304 stainless steel.

## 2.5 PUMP CONSTRUCTION

- A. Water Tight Sealings: Nitrile rubber O-rings against machined surfaces.
- B. Cable Entry Design:
  - 1. Seal: Torque-free mechanical compression type with strain relief. Do not use epoxies, silicones, or other secondary sealing. Submersible cable entry shall be field replaceable without replacing cable.
  - 2. Seal junction chamber from motor by terminal board and an elastomer compression seal.
- C. Pump Motor:
  - 1. Squirrel cage induction type, housed in air-filled watertight chamber.
  - 2. Dip and bake stator three times in NEMA Class F varnish and heat shrink fit into the stator housing. Do not use designs requiring penetration of stator housing.
  - 3. Motor cooling system:
    - a. Thermal radiators integrally cast into stator housing, up to 10.5 HP.
    - b. Circulation of pumped media through a cooling jacket for 15 HP and larger.
- D. Pump Shaft Bearings:
  - 1. Permanently lubricated ball bearings.
    - a. Upper Bearing: Single row deep groove.
    - b. Lower Bearing: Two-row angular contact.
  - 2. Sealed completely from pump liquid.

- E. Minimum B10 Bearing Life: 20,000 hours at any point on head-capacity curve.
- F. Mechanical Seals: Tandem independent and run in a standard motor oil reservoir.
- G. Impeller: Dynamically balanced, double shrouded, non-clog, single vane capable of handling 3 inch diameter solids, unless otherwise scheduled.
- H. Equip each pump with stainless steel lifting chain and submersible pump cable.
- I. Provide sliding guide bar bracket unit to guide on at least two rails which is an integral part of pump unit. Do not permit any portion of the pump or guidance system to bear on sump floor. Do not use guide cables.
- J. Provide metal-to-metal discharge pump/elbow connection seal. Do not use diaphragm or O-ring type seals.

## 2.6 PERFORMANCE

- A. Pump motor:
  - 1. 3 phase motor.
  - 2. Non-overloading throughout pump curve.
  - 3. Capable of 15 evenly spaced starts per hour.
  - 4. Capable of running dry indefinitely without damage.
  - 5. Motor shall be rated for the site elevation.

## 2.7 PROTECTIVE COATING

- A. Pump Exterior: PVC epoxy primer and chloric rubber paint finish.
- B. Impeller: PVC epoxy or rislan.

## 2.8 ACCESSORIES

- A. Pump accessories supplied by pump manufacturer.
- B. Provide pump accessories required for proper installation and/or as recommended by manufacturer, including the following.
  - 1. Upper and intermediate guide bar brackets with stainless steel nuts and bolts.
  - 2. Stainless steel guide rails and brackets with stainless steel nuts and bolts.
  - 3. Stainless steel lift chain.
  - 4. Safety chain hook.

5. Cable holder for pump cable and float cable.
6. Cable support grip.
7. Anchorage.
8. Cable rack for high level float.
9. Self-weighted float switch, Flygt Model ENH-10.
10. Check valve, flanged ends, line size, Flygt Model HDL 5087.
11. Plug valve, eccentric, flanged ends, line size, BUNA packing, neoprene plug facings, lever handle, DeZuric series 100, Fig. No. 118.
12. Standard discharge connection.
13. Wet Well: Aluminum access frame and cover, single door with spring assist, 48 inches x 36 inches, with stainless steel hinges and accessories, locking mechanism to accept a Best brand government padlock, and hinged safety grating built-in.
14. Dry Well: Aluminum access frame and cover, single door, 36 inches x 36 inches, with stainless steel hinges and accessories, and locking mechanism to accept a Best brand government padlock.
15. Transducer Containment Fittings:
  - a. 8 x 6 inch PVC Schedule 40 reducer coupling.
  - b. 8 inch PVC Schedule 40 cap.
  - c. 8 inch Schedule 40 pipe.

C. Controls:

1. RACO Verbatium – No substitute, including the following.
  - a. Enclosure – NEMA 4X.
  - b. Environmental – Heater.
  - c. Local alarm relay output.
2. Milltronics Hydro-Ranger 200, Part No. 7ML1034 - 1AA1 with Echomax XPS-10 transducer, Part No. 7ML1115 - 0CA31.
3. NEMA 4X enclosure box for mounting of RACO Verbatium outside of, but attached to, motor control center. Provide connections in motor control center for RACO Verbatium unit.

4. Telephone line grounding/terminator box, Hoffman No. A-1086CHQRFG, with 1/2 inch plywood backing plate mounted inside. Mount box beside and connect to the RACO Verbatium box with 3/4 inch conduit nipple.
5. RACO Verbatium enclosure and backplate, Hoffman No. A-201608LP and No. A-20P16.

## 2.9 MOTOR CONTROL CENTER

- A. Duplex pump control panel supplied by pump supplier.
  1. Manufacturer: E.G. Pumps Controls.
- B. Provide duplex pump controls required for proper installation and/or as recommended by manufacturer including the following:
  1. If MCC is required provide it with separate cubicle to accommodate Milltronics unit with glass view port on door.
  2. Two pump Circuit Breakers: UL interrupting rating not less than 14,000 amperes RMS symmetrical at 480 volts or 22,000 amperes RMS symmetrical at 240 volts.
  3. Two NEMA rated, full voltage non-reversing motor starters.
  4. Duplex Logic Chassis (an anodized aluminum sub-assembly) with Logic Panel Including:
    - a. Two Hand-Off-Auto selector switches.
    - b. Two run pilot lights (red).
    - c. Two off pilot lights (green).
    - d. Level alarm pilot light.
    - e. Alarm silence pushbutton.
    - f. Motor over temperature sensor – shut pump down.
    - g. LED status indication pilot lights for each relay function.
    - h. GFCI duplex convenience receptacle. Mount inside on front plate.
  5. Space heater to prevent condensation within the enclosure.
  6. Ground lugs for pump and service connections.
  7. Enclosure NEMA 3R.
  8. Additional control breaker - 15 amp, 1 pole.
  9. Control power transformer - 2 KVA, 16.7 amps.

10. Phase Monitor Relay, 200-240 volt or 440-480 volt, 3 phase as required; capable of detecting loss of a single phase, under-voltage, over voltage, and voltage unbalance. Alarm will be sent to the RACO Verbatium unit.
11. Lightning surge arrestor.
12. Elapsed time meter for each pump.
13. Lag pump time delay relay.
14. Seal failure relay, Flygt, with pilot light.
15. Audible Alarm horn, 93 dB at 20 feet.
16. Alarm beacon with flasher.
17. Alarm memory circuit to maintain alarm beacon until manually reset.
18. Alarm and control enclosure.
19. Additional isolated dry contacts.
  - a. Motor over-temperature (2) - contact type form "C".
  - b. Motor overload trip (2) - contact type normally open.
  - c. Seal failure (2) - contact type form "C".
  - d. Power failure - contact type form "C".
20. High level float status light.
21. High level float test switch
22. Main breaker.
23. Operating voltage sign and station name.
24. pH enclosure, Hoffman No. U-U504030.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Wet well and dry well shall be fabricated and installed by the LANL Standard Lift Station Drawings, and the wet well tested for water exfiltration, per LANL Standard Specification 02535, Manholes.
- B. Install pumps and equipment in accordance with manufacturer's instructions and Contract Drawings and LANL Standard Drawings ST-G3020-2.

- C. Install pumps level, plumb, accurately aligned, with leak-proof pump connection, and easily removed without entering wet well.
- D. Install all electrical equipment and electrical boxes outside of lift station pit except for the transducer that is installed by LANL's Support Services Subcontractor (SSS).
  - 1. Install Millitronics Hydro-Ranger in electrical motor control center.
  - 2. Adjust settings as directed by LANL's SSS.
- E. Make no splices in cable.
- F. Furnish and install all power connections to and from the control box in accordance with provisions of Division 16.
- G. Provide communications link between the lift station monitoring/controls and the TA-46 Wastewater Plant PLC system. System shall be installed and available for testing during the Acceptance Inspection.

### 3.2 HIGH LEVEL FLOAT

- A. Suspend on bracket as shown on Drawings.
- B. Make no splices in cable.
- C. Adjust float level as directed by LANL's Support Services Subcontractor (Utilities).

### 3.3 MANUFACTURER'S ON-SITE SERVICE

- A. Arrange for a factory trained service engineer to be present to check installation and operation.
- B. Arrange for a factory trained service engineer to provide a minimum of 4 hours per pump station of training to operating personnel on operation and maintenance of pumping equipment.
- C. Provide a report by the service engineer certifying that equipment has been installed and is operating correctly.

### 3.4 LANL ACCEPTANCE INSPECTION, TESTING, ADJUSTING, AND TIE-IN

- A. LANL Construction Inspector will contact LANL's Utility Group Wastewater Representative at least 10 working days in advance to have LANL's Support Services Subcontractor (Utilities) perform the following:
  - 1. Video inspection of gravity and force main sewer lines.
  - 2. Inspection, testing, and adjusting of alarms and controls on lift station.
  - 3. Inspection of lift station for compliance with drawings and specifications.

4. Tie-ins to existing sanitary sewer system.
- B. LANL Construction Inspector to ensure all drains or buildings connected to the lift station has an approved WPF (Waste Profile Form) for discharge to the sanitary sewer for all anticipated wastewaters.

### 3.5 EQUIPMENT SCHEDULE

- A. Flygt Model [ ] with Impeller Model [ ].
  1. GPM/TDH (feet): [ ]
  2. HP: [ ]
  3. Discharge Pipe (inches): [ ]
  4. RPM: [ ]
  5. Volts/Phase: [ ]
  6. Max motor Input at design point (KW):[ ]
- B. Site elevation: 7500 feet.

END OF SECTION

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Do not delete the following reference information:

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FOR LANL USE ONLY

This project specification is based on LANL Master Construction Specification Rev. 3, dated September 18, 2003.